RESEARCH PROJECT SEGMENT

State: Alaska

Project No.: F-9-3 *Name:* Sport Fish Investigations of Alaska.

Study No.: R-IV *Study Title:* A Study of Dolly Varden in Alaska.

Job No.: R-IV-B *Job Title:* **Effects of Logging on Dolly Varden.**

Period Covered: July 1, 1970 to June 30, 1971.

ABSTRACT

This report presents the results of the first year of study on the effects of logging on the Dolly Varden, Salvelinus malma (Walbaum). Emphasis of study included determining the pre-logging status of fish populations utilizing Hood Bay Creek and monitoring pre-logging fish populations of seven additional streams within the Hood Bay watershed.

The data collected during the life history study of the Dolly Varden at Hood Bay was reviewed. Pre-logging indexes of the populations of Dolly Varden; chum salmon, Oncorhynchus keta (Walbaum) and pink salmon, O. gorbuscha (Walbaum), utilizing Hood Bay Creek were obtained for a five-year period (1966 - 1970). The counts are on a monthly basis.

Study areas were established in eight streams (including Hood Bay Creek) in the Hood Bay watershed. Each study area was surveyed and mapped. Monthly samples were obtained with minnow traps from each of the areas. The sampled fish were identified, enumerated, and returned to the stream. Analysis of the monthly sampling on a catch per trap basis revealed no significant trends in population sizes.

RECOMMENDATIONS

The primary emphasis of research should continue to be directed toward comparing fish populations as related to pre- and post-logging environments. This research should follow three main lines of investigation, which are as follows:

1. Continue to obtain pre-logging information on rearing Dolly Varden within the proposed logging areas on Admiralty Island. This information will be obtained by the monthly stream monitoring at Hood Bay. Since most of the watersheds being monitored are within planned logging areas, they will also provide future post-logging indexes.

2. Establish guidelines for future research on the effects of logging on Dolly Varden. One approach to this would be on-the-ground surveys of logged and unlogged watersheds throughout Southeast Alaska. To locate the logged watersheds and proposed areas, an atlas of Southeast Alaska should be assembled. Information regarding the dates and areas of past logging, areas of present logging, and sites of proposed logging could be obtained from the State or Federal agency involved. After selecting representative watersheds from the atlas, on-the-ground surveys should be conducted. During these surveys, emphasis should be placed on determining criteria to use in appraising the possible damage resulting from logging on fish rearing areas and accessibility of streams for sport fishing.

3. Prepare an annotated bibliography on effects of logging to fish.

OBJECTIVES

1. Determine the pre-logging status of fish populations utilizing Hood Bay Creek.

2. Establish a pre-logging index of distribution and abundance of rearing Dolly Varden within proposed logging areas on Admiralty Island.

TECHNIQUES USED

To determine the pre-logging status of fish populations utilizing Hood Bay Creek, historical fish counts were necessary. These counts were obtained by reviewing the Dolly Varden life history study which contains Hood Bay Creek fish counts from 1966 to the present.

Establishing a pre-logging index of distribution and abundance of rearing Dolly Varden within the proposed logging areas was initiated by selecting eight monitoring streams located throughout the Hood Bay watershed (Figure 1). The streams were selected after a general survey of the entire watershed. Each of the selected streams was walked and a study area ranging in length from 123 - 398 feet (Table 1) was established. Individual study areas were surveyed and mapped, with all logs, riffle areas, and pools recorded.

TABLE 1 Study Streams Showing Length of Study Sites and Number of Traps Set in Each.

Study Stream	Study Area Length (Ft.)	No. Traps
1	123	9
2	284	11
3	289	16
4	246	12
5	337	11
6	160	8
7	398	12
8	208	13

Each trap in the study area was identified as to location and habitat. The number of traps set in the individual areas varied from 8 - 16 (Table 1). The traps were set overnight, generally for a 24-hour period. All captured fish were identified, enumerated, and returned to the location of capture with as little handling as possible. It was decided not to measure the fish as originally planned, in order to reduce handling. The sets were made on a monthly basis and as close to the same time each month as practicable.

Double-ended, conical entrance minnow traps, baited with fresh salmon eggs, were used for sampling. A modification of the standard minnow trap was deemed necessary after experimental 24-hour sets revealed a low retention rate (Dolly Varden, 75%; coho, 52%) of captured fish (Table 2). The modification used consisted of two inward swinging wires mounted on the inner side of each entrance (Figure 2). This modification resulted in a much higher retention rate (Dolly Varden, 98%; coho, 94%).

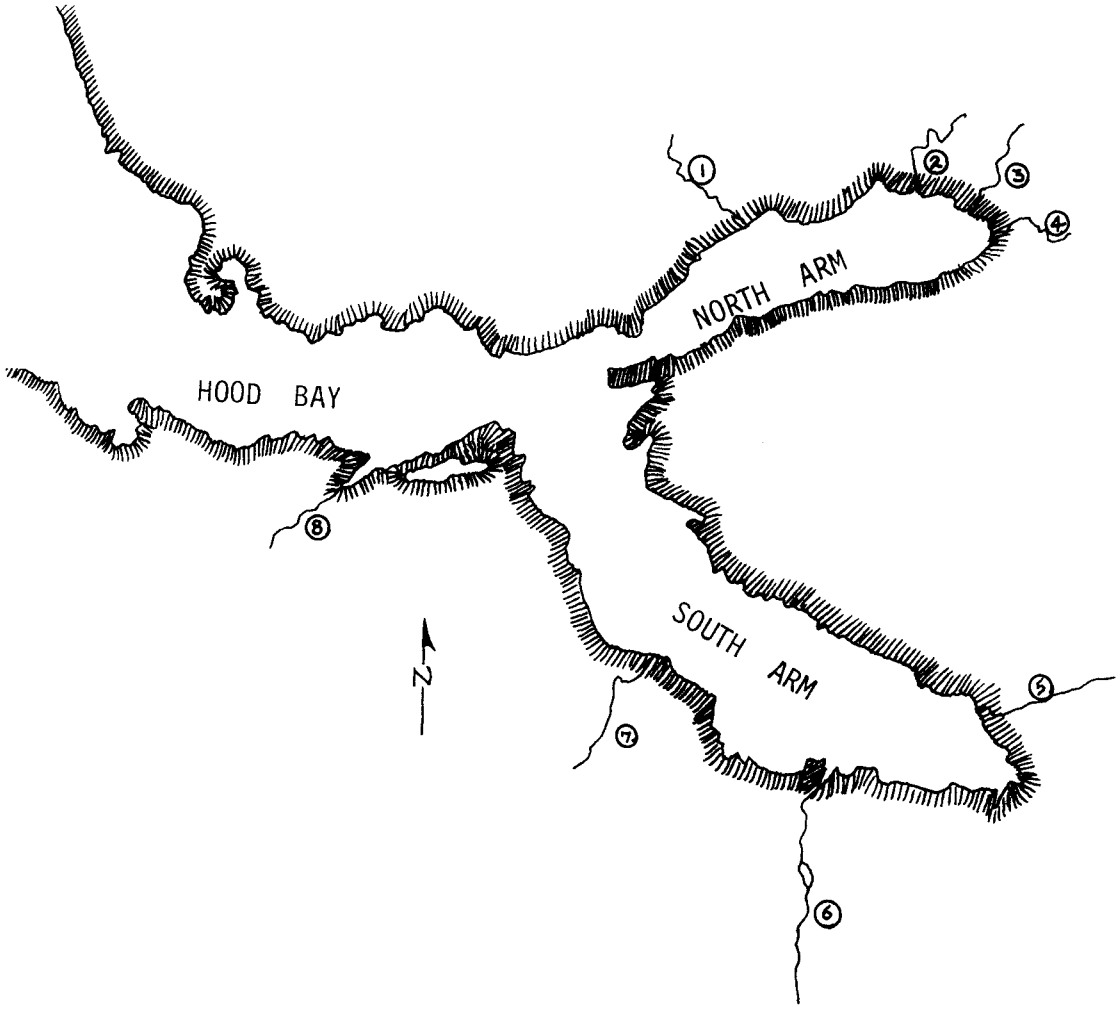

FIGURE 1 LOCATION OF STUDY STREAMS IN THE HOOD BAY WATERSHED.

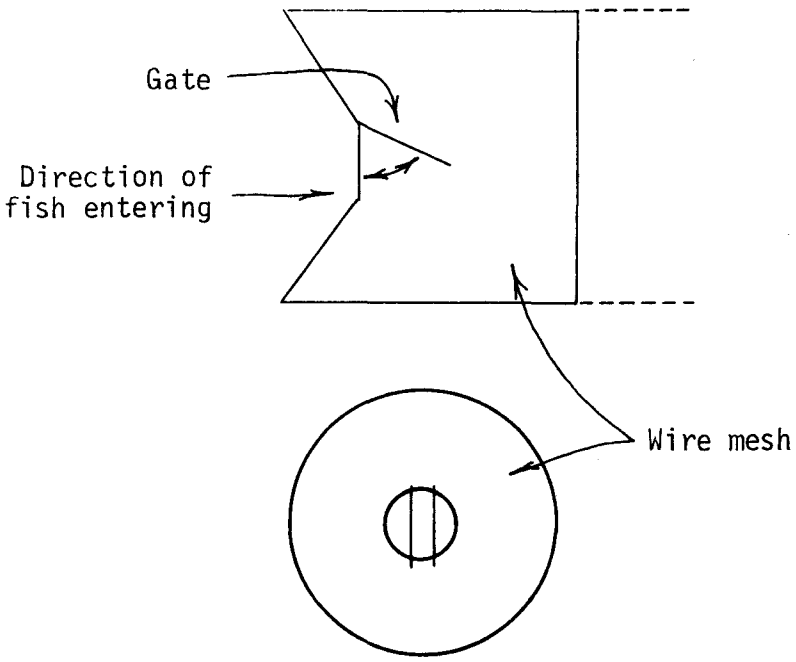

FIGURE 2 SIDE AND END VIEW OF ONE-HALF OF A MINNOW TRAP SHOWING MODIFICATION.

TABLE 2 Number and Percent of Marked Dolly Varden and Coho Young Retained in Unmodified and Modified Minnow Traps During a 24-Hour Period.

	Unmodified	Modified
Marked Dolly Varden	324	287
No. retained	243	280
% retention	75%	98%
Marked Coho	152	143
No. retained	79	135
% retention	52%	94%
No. Traps	14	10
Length of set	24 hrs.	24 hrs.
Size range of fish	42-69 mm	42-69 mm

FINDINGS

The inmigration counts of Dolly Varden, Salvelinus malma, pink salmon, Oncorhynchus gorbuscha, and chum salmon, O. keta, in Hood Bay Creek are presented in Table 3. The 1970 counts will be the final pre-logging index, as the Hood Bay field station is being closed. However, the five years of counts available probably give a fair representation of the pre-logging status of the fish populations utilizing Hood Bay Creek.

TABLE 3 Dolly Varden, Pink Salmon, and Chum Salmon Inmigration, Hood Bay Creek, 1966-1970.

	Month	1966	1967	1968	1969	1970
Dolly Varden	June	46	0	0	0	0
	July	1,428	561	666	1,288	558
	August	1,981*	1,634	1,730	1,636	1,920
	September	1,245*	3,408*	1,894*	3,146*	4,473*
	October	812*	338*	717*	1,826	2,381*
	November	21*	13	0	8	31*
	Total	5,533	5,954	5,007	7,904	9,363

TABLE 3 (Cont.) Dolly Varden, Pink Salmon, and Chum Salmon Inmigration, Hood Bay Creek, 1966-1970.

	Month	1966	1967	1968	1969	1970
Pink Salmon	June	0	0	0	0	0
	July	25	32	1,835	177	516
	August	6,750	2,648	18,678	6,484	11,516
	September	13,670	2,712	11,834	9,174	15,719
	October	6	4	0	3	2
	November	0	0	0	0	0
	Total	20,451	5,396	32,347	15,838	27,753
Chum Salmon	June	0	0	0	0	0
	July	425	1,252	1,938	797	458
	August	851	1,849	1,185	534	666
	September	12,046	13,596	909	3,407	7,971*
	October	2,523	1,116	39	369	466
	November	0	2	0	0	0
	Total	15,845	17,815	4,071	5,107	9,561

*Includes estimate.

In addition, historical information concerning the spawner:nonspawner ratio of inmigrant Dolly Varden at Hood Bay Creek is included (Table 4).

TABLE 4 Estimated Number of Dolly Varden Spawners and Nonspawners Entering Hood Bay Creek, 1966-1969.

	1966	1967	1968	1969
	(n=131)	(n=338)	(n=269)	(n=462)
Spawners - Female	988	1,115	1,119	1,029
- Male	1,170	684	329	579
- Total	2,158	1,799	1,448	1,608
Nonspawners	3,375	4,155	3,559	6,296
Total inmigration	5,533	5,954	5,007	7,904

The stream monitoring revealed populations of Dolly Varden, cutthroat, Salmo clarki, rainbow, S. gairdneri, coho, O. kisutch, and cottids are present in the study areas. However, only one study area (#8) contained cutthroat, and only five of the areas (1, 2, 3, 4, and 8) contained rainbow trout. During the June settings, adult steelhead were observed in areas #1 and #3, which indicates a sea-run population. Dolly Varden, coho, and cottids were found in all areas. Analysis on a catch per trap basis showed no significant trend to the catch numbers (Table 5). Although the coho populations appear to increase in most study areas as the season progressed, this is thought to be partially a result of 0 age fish becoming large enough for retention in the traps rather than an actual increase in overall numbers.

TABLE 5 Catch Per Trap of Individual Species Shown by Month and Stream, at Hood Bay, 1970.

		Study Stream							
	Month	1	2	3	4	5	6	7	8
Dolly Varden	June	0.56	7.27	10.50	4.50	19.73	44.00	6.83	5.77
	July	1.33	14.55	20.00	9.33	29.64	48.75	9.25	8.46
	August	1.11	8.55	10.25	5.08	44.45	53.38	10.00	5.00
	September	0.56	2.73	5.19	6.42	13.30	13.25	5.42	1.77
Coho Salmon	June	0.00	12.54	17.94	15.92	3.64	12.63	1.92	9.38
	July	0.00	18.64	18.44	19.00	5.73	7.88	3.92	10.38
	August	0.11	15.91	23.69	25.33	9.45	15.50	7.67	14.00
	September	0.56	19.36	20.88	50.33	10.70	14.25	11.50	8.15
Rainbow	June	0.56	0.45	1.25	0.00	0.00	0.00	0.00	0.00
	July	2.33	0.27	2.44	0.08	0.00	0.00	0.00	0.38
	August	3.56	0.27	0.75	0.00	0.00	0.00	0.00	0.00
	September	2.67	0.09	3.56	0.00	0.00	0.00	0.00	0.00
Cottid	June	0.56	5.36	6.44	5.67	2.82	0.25	2.25	3.15
	July	2.44	6.45	6.38	6.17	1.55	0.00	0.33	2.46
	August	2.78	7.27	4.06	9.50	1.55	0.38	0.50	3.38
	September	1.44	3.00	0.13	4.67	1.80	0.50	2.58	1.62
Cutthroat	June								0.85
	July								0.08
	August								0.15
	September								0.00

One year's results showed no monthly trend, but continued sampling may reveal significant yearly trends. In evaluating yearly catch information, consideration must be made of a recent study concluded by Burns (1971), in which it was shown that natural variation in the carrying capacity of a stream could be as high as 50%.

ACKNOWLEDGEMENTS

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LITERATURE CITED

Burns, James W. 1971. The Carrying Capacity for Junvenile Salmonids in Some Northern California Streams. Calif. Fish and Game. 57(1):44-57.

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